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ABSTRACT

The aim of this study was to describe and analyze the nature of group work through a series of thirteen video taped classroom lessons for fourth grade students. Using a case approach technique, the emphasis was on methodological problems. The study showed that even the investigation of a single mode of instruction such as group work is a highly complicated task. On the other hand, it revealed the fertility of the use of a theoretical framework in an intensive case approach. It was found that pupils' group work is colored with adapted and task-oriented acts. Five appendices are included in the study: 1) interaction variables- rotated factor matrix; 2) test variables, personality trait assessment and sociometric variables; 3) the general course of a group work lesson -12th lesson; 4) Koskenniemi's sociological individual types; and 5) a list of variables. (FDI)

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VI. Group Work as a Social Interaction Process
A Case Approach

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Pentti Holopainen

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Investigations into the Instructional Process

VI Group Work as a Social Interaction Process
A Case Approach

1. Introduction

This investigation forms part of a more extensive research project under way at the University of Helsinki Institute of Education, in which the instructional process is investigated applying a variety of taxonomies. The purpose of the present report is the description and analysis of a videotaped group work series.

2. Theoretical Framework

Apart from the theoretical framework proper, the investigation was guided by the views put forward by Dewey, George H. Mead, Koskenniemi, Newcomb and Ackoff concerning the nature of social interaction (Dewey 1933, 1940; Koskenniemi 1936, 1952 and 1968; Mead 1964; Newcomb 1955; Ackoff 1957-1958). The theoretical framework proper follows Parsons's and Bales's model of social interaction (Parsons, Bales and Shils 1953, 63-109, 163-269), the "coordinates" of which are, according to Zelditch Jr.:

Goal attainment = df the gratification of the units of the system

Adaptation = df the manipulation of the environment in the interests of goal attainment

Integration = df the attachment of member-units to each other in their distinction from that which is non-system.

Tension = df the malintegration of member-units seen as themselves as a system

(Zelditch Jr. 1956, 404).

For the present group work analysis, the paradigm was modified into a fourfold scheme as follows:

A

Organization of the various resources of the group; orientation toward the task; division of labour	Striving for the goal by concentrating on the task and utilizing the various resources in possession of the group
States of emotional tension between the group members, e.g., aggression and anxiety	Attraction between and solidarity of the group members; cohesion of the group

G

T

I

From the theoretical framework the following problems were derived.

1. What are the dimensions of social interaction in group work? Do they correspond to the logical dimensions of the theoretical framework?

2. Does an empirical description system make possible a longitudinal lesson-by-lesson and phase-by-phase description of the pupils, the teacher and the group? Can pupils' functional roles be identified by means of the description system?

3. Can linear relationships be found between pupils' interaction behaviour and their school achievement, abilities, personality traits or social status?

3. Research strategy

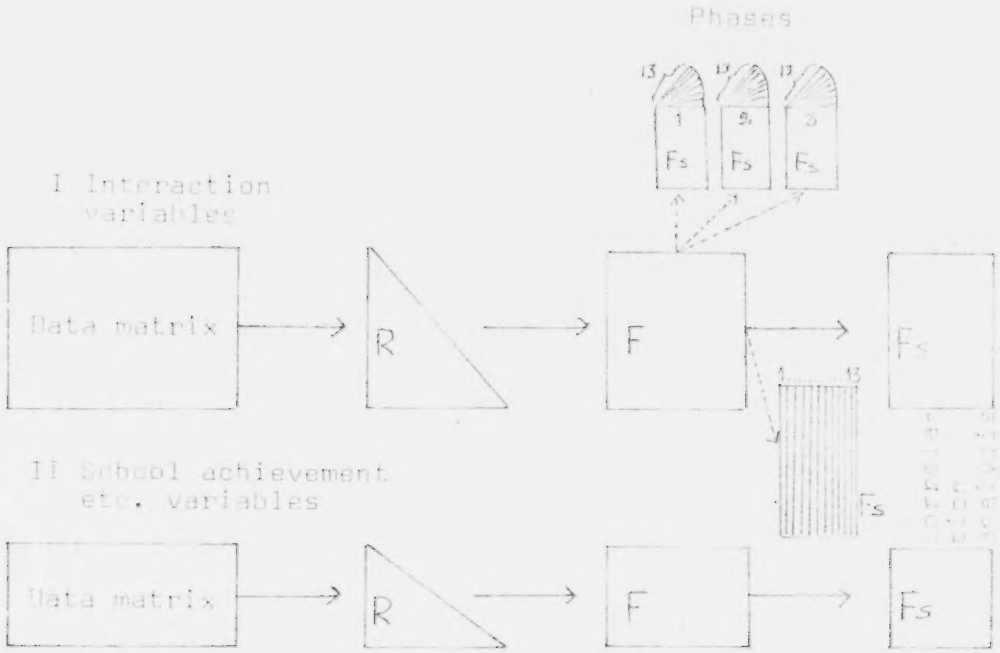
The first problem will be approached by means of an R type factor analysis, computed over the total group work series in order to find out whether "social interaction dimensions" can be isolated from what appears at first sight to be a structureless domain.

To elucidate the second point, factor scores will be computed for each pupil and teacher, lesson-by-lesson and phase-by-phase. The phases will be obtained by dividing each group work lesson into three 10-minute periods. The factor scores will provide information on both the differences between indi-

vidual interactions and the differences between individuals' functional roles by lessons and phases.

The third point will be explored by carrying out an R type factor analysis from the intercorrelations of school achievement, ability, personality-trait assessment and sociometric variables and by estimating the factor scores. These scores will be correlated with the factor scores for the interaction variables. Information will thus be obtained on whether these two description spaces are or are not linearly interrelated.

The research strategy may be illustrated by means of the following schematic representation:



4. Material

The study will be concerned with 13 group work lessons, videotaped in the classroom of the Institute of Education during the academic year 1968-1969. The subjects were pupils of 4th primary school grade; of the subjects 10 were girls and 8 were boys. The groups were formed on the basis of friendship and cooperation preferences. Basic information on the material is given in Table 1.

Table 1. The videotaped group work lessons, the school subjects, the dates of recording and the composition of the groups

Lesson	Date of Rec.	Composition of groups	
1. Civics	Oct. 18, 1968	Lare, Ola, Pena, Jude	(B)
2. Arithmetic	Nov. 8, 1968	Eri, Tar, Out, Sin	(G)
3. Finnish	Jan. 31, 1969	Eri, Mai, Päi, Sin, Pir	(G)
4. Civics	Feb. 14, 1969	Anu, Tar, Päi, Rii, Jaa	(G)
5. Civics	Feb. 20, 1969	Lare, Ola, Jude, Pena, Heka	(B)
6. Arithmetic	Feb. 24, 1969	Eri, Mai, Out, Sin, Pir	(G)
7. Religion	March 13, 1969	Lare, Ola, Jude, Pena, Heka	(B)
8. Finnish	March 14, 1969	Anu, Tar, Pir, Jaa	(G)
9. Finnish	March 21, 1969	Eri, Mai, Sin, Pir, Rii	(G)
10. Geography	March 28, 1969	Lare, Ola, Jude, Pena, Heka	(B)
11. Finnish	March 28, 1969	Eri, Out, Sin, Rii	(G)
12. Arithmetic	May 12, 1969	Lare, Ola, Jude, Pena, Heka	(B)
13. Arithmetic	May 14, 1969	Ari, Juki, Sami	(B)

B = Boys
G = Girls

Certain facts relevant to the interpretation of the results become apparent from the table.

1. The school subjects were not evenly represented in the sample.
2. The participation of pupils in groups was not equal.
3. There were uncontrolled gaps between the videotaped lessons.

These shortcomings in the design of the study were due on the one hand, to the endeavour made to describe the group work process as such, in a natural setting, without advancing any assumptions regarding the possible impact of the school subject and, on the other hand, to the way the groups were formed and to certain initial technical difficulties.

5. Method of observation and its reliability

Bales's Interaction Process Analysis System was used, in a slightly modified form, as the means of observation:

1. Shows solidarity, raises other's status, gives help
2. Shows tension release, jokes, laughs
3. Agrees, accepts
4$_1$. Gives procedural directions
4$_2$. Gives suggestions
5. Answers extensively, gives opinion, evaluation
6. Answers narrowly, gives information
7. Asks narrowly, asks for information
8. Asks extensively, asks for opinion, evaluation
9. Asks for suggestion, procedural directions
10. Disagrees, shows rejection, withholds help
11. Shows tension, asks desperately for help, withdraws out of field
12. Shows aggression, deflates other's status (Bales 1950, 59).

Both Scott's Π and Cohen's k coefficient were used in the evaluation of coder reliability. Each of the coder pairs 1-2, 3-4 and 5-6 selected a sample of 300 acts from the material at random. The reliabilities were as follows:

Coder pair	Scott's Π
1 - 2	.92
3 - 4	.75
5 - 6	.79

A sample of 1.000 acts was randomly selected by the coder pair 7-8, and both the over-all reliabilities and reliabilities by categories were evaluated in terms of Scott's Π and Cohen's k coefficients. The over-all reliabilities were

Π = .80
k = .71

It will be seen that reliability was somewhat lower when use was made of Cohen's k coefficient. This was perhaps due to the fact that, when Scott's Π coefficient is employed, the marginal distributions are assumed to be the same for both coders, whereas no such assumption is involved in the use of the k coefficient, but one proceeds act by act thereby (Cohen 1960, 39). Therefore, the category-specific reliabilities were computed by employing the k coefficient.

Table 2. Category-specific reliabilities

Category	k
1	.66
2	.42
3	.74
4_1	.74
4_2	.70
5	.50
6	.72
7	.76
8	.44
9	.58
10	.67
11	.47
12	.65

The reliabilities were satisfactory, although those for categories 2, 8 and 11 were lower compared with the others. Category 8 was relatively rarely used; categories 2 and 11 represented the emotional area, the reliable coding of which is difficult.

6. Methods of statistical analysis

The use of customary multivariate techniques in small group process analysis is complicated by the fact that small groups of pupils are concerned; in other words, a small group of pupils acts uniquely in any particular group work situation. The problem arising from the small size of the group of subjects was solved

by forming so-called situational subjects of the pupils. Each pupil was placed in the data matrix as many times as he participated in the group work lesson to be described. This procedure is unlikely to form an obstacle to the description of either the interaction structure or the interaction process. In the analysis, pupils are both actors and reactors of communication (Parsons 1968, 430).

Each pupil was described by Bales's lesson profile both as an actor and as a reactor. The category frequencies were transformed, in order to correct the distributions, by employing the logarithmic transformation log (f +1) for the total group work data and the transformation log 3 x (f +1) in the phase analysis (Edwards 1963, 130). The interaction categories were intercorrelated and a R type factor analysis was computed from the total data. The principle axis method was used in factoring and the rotation was carried out by the varimax method. The four-factor solution was interpretationally the most clear-cut (Appendix 1).

A similar analysis was made from the school achievement and ability variables, the personality-trait assessment variables and the sociometric variables (Appendix 2).

7. Results

7.1. Social interaction

Factor I. "Integration"

Categories	Factor loadings
2. Jokes, shows tension release, laughs	.757
5. Gives opinion, evaluation, analysis	.706
11. Shows tension, asks for help, withdraws out of field	.647

Should interaction in an adult group be in question, the factor could be named "tension management". In that case, integration would be represented mainly by categories 1 and 12 (according to Bales's interaction system). In small groups of children, integrative elements are likely to be represented by categories 2 and 11, i.e., children are likely to rid themselves of the tension caused by the task by joking and laughing, which in turn may enchance cohesion and the "we spirit", in spite of the states of tension.

Factor II. "Adaptation"

Categories	Factor loadings
4_1. Gives procedural directions	.675
1 . Shows solidarity, gives help	.586
3 . Agrees, accepts, complies	.560
10 . Disagrees, shows rejection	.504

The giving of procedural directions is most clearly in evidence in the factor pattern. Kindliness and an ambivalent attitude toward directions are associated with it. The assumption may be justified that what is concerned is a division-of-labour process evoking now favourable and now unfavourable reactions in the pupils.

Factor III. "Task orientation"

Categories	Factor loadings
9 . Asks for directions, suggestions, possible ways of actions	.752
4_2. Gives suggestions	.625
7 . Asks narrowly, asks for information	.518
6 . Answers narrowly, gives information	.489

Communication associated with the performance of the task was most clearly in the foreground here, as no emotional reactions loaded on this factor.

Factor IV. "Aggression"

Categories	Factor loadings
12. Shows aggression, asserts self	-.721
(10. Disagrees, shows rejection	-.484)

The factor pattern reflects pupils' aggressiveness and self-assertion.

The factor analysis is difficult to interpret. The factors were not pure, in the sense that a simple structure failed to emerge. Children's emotional reactions seem to become accentuated in group work, judging by the fact that almost every factor included emotional elements. The absence of a clear-cut structure was due, among other things, to the fact that both the sample of group work lessons and that of pupils were small in size and, also the heterogeneity of the groups and group work tasks. The dimensions, however, reflect some convergence with the logical model. The following argument put forward by Bereiter is also relevant here: "Interaction analysis has properties that make it imperfectly amenable to ordinary multivariate techniques. Measurement is usually based on the frequency rather than the more familiar additive model ... . A more basic difficulty is that a complete set of observation is full of internal constraints. Categories of behavior are not independent, because emitting one kind of behavior hampers a person's emitting another at the same time. Receiving a certain behavior means that someone else had to emit it. Individuals are not independent, because when one person is doing something, the other members are likely to be prevented from acting" (Bereiter 1986, 759).

7.2. Analysis by groups

Factor scores were computed for the groups, as means of the factor scores of the group members. Interaction of the boy group

1 = Civics
5 = Civics
7 = Religion
10 = Geography
12 = Arithmetic

2 = Arithmetic
3 = Finnish
6 = Arithmetic
9 = Finnish
11 = Finnish

Figure 1. Factor scores for the groups lesson-by-lesson

(lessons 1, 5, 7, 10 and 12), girl group (lessons 2, 3, 6, 9 and 12) and the teacher is illustrated lesson by lesson, in Fig. 1. Communication in the boy group was typified by higher than average (mean of factor score = 500, standard deviation = 100) integration. Adaptation was highest during the fourth group work lesson. It could have been expected to be most pronounced during the initial part of the group work period, but, admittedly, only on the condition that the tasks assigned would have been instances of a comprehensive theme, rather than mutually disconnected tasks assigned to the group separately for separate lessons. There were little variations in task orientation, except that they attained a peak during the first lesson. Aggression showed variation but rose sharply during the last lesson (Appendix 3).

In the girl group, the centre of gravity of interaction lies in task orientation, which is notably higher than the mean of the factor scores. Integration is near the average level, although it later rises. The "division of labour" is concentrated on during the first and last lessons, aggression reaching its maximum during the last lesson. The figure gives little information on the teacher's interaction behaviour during the lessons mentioned: adaptation is very accentuated, integration, task orientation and aggression are secondary. It would seem that she tried to act as a guide and catalyst of group work.

7.3. Interaction by pupils

The pupils' interaction behaviour from one lesson to the next is illustrated in Figs. 2 and 3. A few pupils whose contribution to the group work was more conspicuous than that of others will be considered below.

Boys:

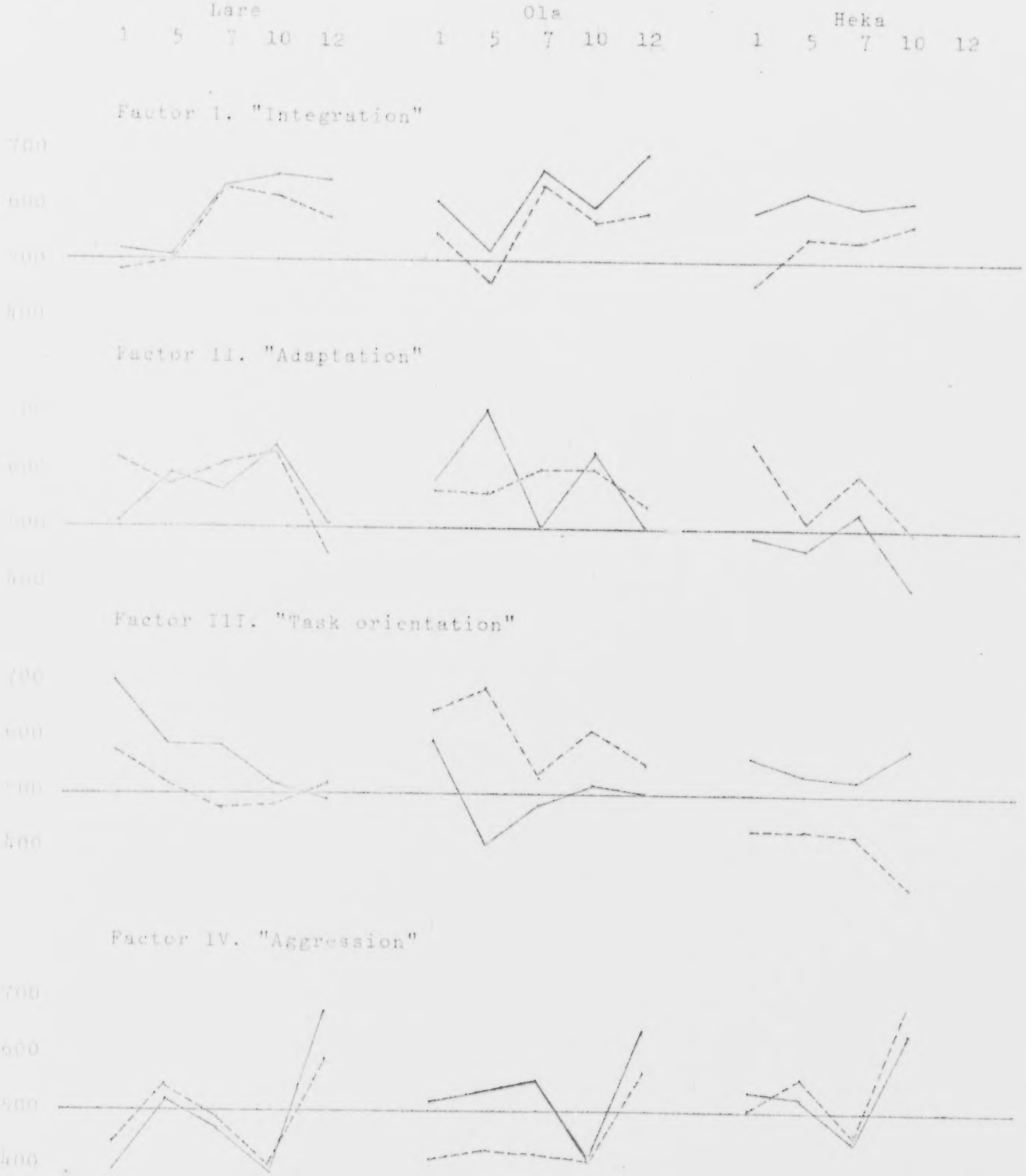
Lars was integrative as an actor: he would joke, frequently give opinions of his own and inform others. Adaptation was higher than average, as he guided and helped others but was also critical when necessary. At the beginning his task orientation was intensive but diminished later. Aggressive behaviour was infrequent, except during the last lesson.

As a reactor he displayed features very similar to those observed in him as an actor; in other words, the communication directed to him by other group members were similar to those he directed to them.

Ola's role as an actor was integrative, his adaptation was variable and, according to Bales's interaction classification, his task orientation was of a medium level but failed to give a correct picture of his determined way of working: he worked without conversing much. Aggression was not pronounced, except during the last lesson, when all the group members were frustrated because of the excessively difficult tasks (cf. the general description of the course of the lesson given in Appendix 3).

What Ola was actually like was revealed when considering him as a reactor: the other members of the group made use of his "expert knowledge" and related to him quite favourably.

Heka's role as an actor was integrative: he was the "clown" of the group. He was low on adaptation; he seemed to be comparatively high on task orientation, but he often paid attention to matters irrelevant from the point of view of the task in question. He was not aggressive except during the last lesson.



[1] Reactor means in this context the object of communication

Figure 2. Factor scores for boys lesson-by-lesson

Girls:

Sin was, as an actor, of average level and stable as regards integration. During the first lessons she was high on adaptation but lower in the later lessons. Sin distinguished herself mainly in task orientation and aggression.

Sin's role as a reactor is interesting. The other members of the group greatly relied on her in matters related to the performance of the tasks and related to her in a more friendly way than she related to them.

Eri's role as an actor was integrative, and in the last lesson she scored higher on itegration than previously. At times she tried to concentrate on the task (during the 3rd lesson) and was of average level in adaptation and aggression.

As a reactor, she received integrative communication to a lesser extent than she gave to others. In the other interaction factors, her role corresponded, by and large, to her actor role.

Jaa did not, as an actor, show integration. Her adaptation declined very sharply after the first lesson. She tried to participate in the performing of the tasks but was very aggressive.

Jaa's role as a reactor sheds additional light on her behaviour: within the area of adaptation, the group's contribution was greater than Jaa's but in the other areas it was less. The group members attempted to guide Jaa's behaviour, but they did not trust her in performing the tasks and responded aggressively to her aggressive outbursts.

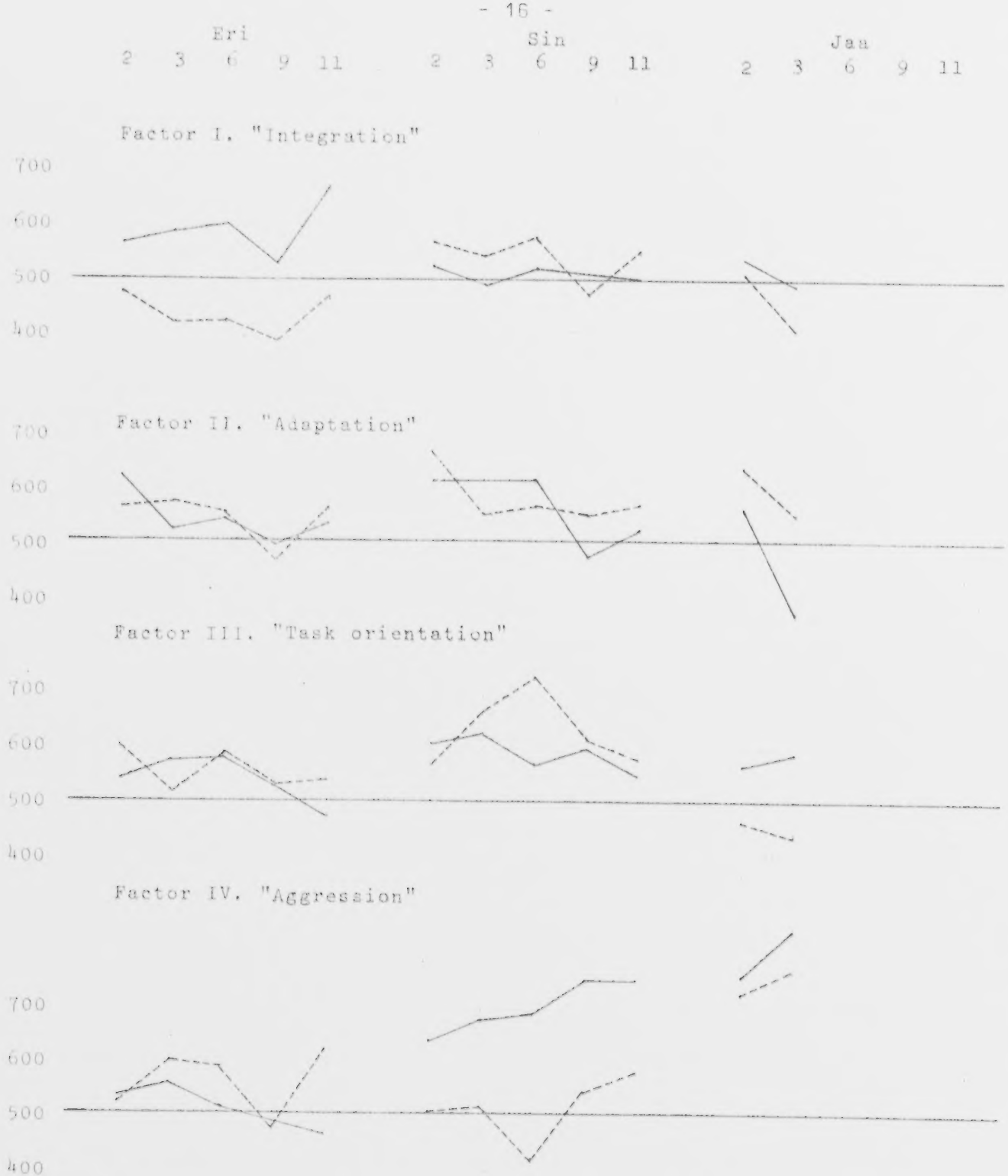


Figure 3. Factor scores for girls lesson-by-lesson

7.4. Phase movement

The phases were formed in such a way that the first phase consisted of the first 10 minutes of each of the 13 group work lessons, the second phase of the next 10 minutes, etc. The description and analysis will be carried out pupil by pupil, because consideration of the whole group by phases would lead to excessive abstractness at the factor score level. A detailed description of the pupil's interaction by phases is given in Figs. 4 and 5. In the text, an account will be given of the general features of this interaction, separately for boys and girls.

Boys (Lare, Ola, Jude, Pena and Heka):

Task orientation was its highest during the first phase of the lessons but declined during the second and third phases. Phase movement analysis, too, revealed that boys were and in this respect they were found to vary little from phase to phase. Aggression increased during the last phase in all the boys, except Ola. The difference between actor and reactor role was small.

Girls (Sin, Eri, Out, Mai and Pir):

In girls, greater variations from phase to phase in interaction were in evidence than in boys, and this was the case irrespective of whether the girl's roles as actors or reactors were in question. Integration reached a maximum during the middlemost phase, task orientation was generally high and increased toward the last phase, except in Mai and Pir. Notable interindividual differences occurred both in adaptation and aggression. The following fact of some interests was observed with the girls: all of them, except Sin, were more integrative as actors than as reactors. This was perhaps due to the circumstance that integrative behaviour was directed at the whole group more than at any individual pupil. Sin was the least integrative in all phases but received integrative communication more than any other girl.

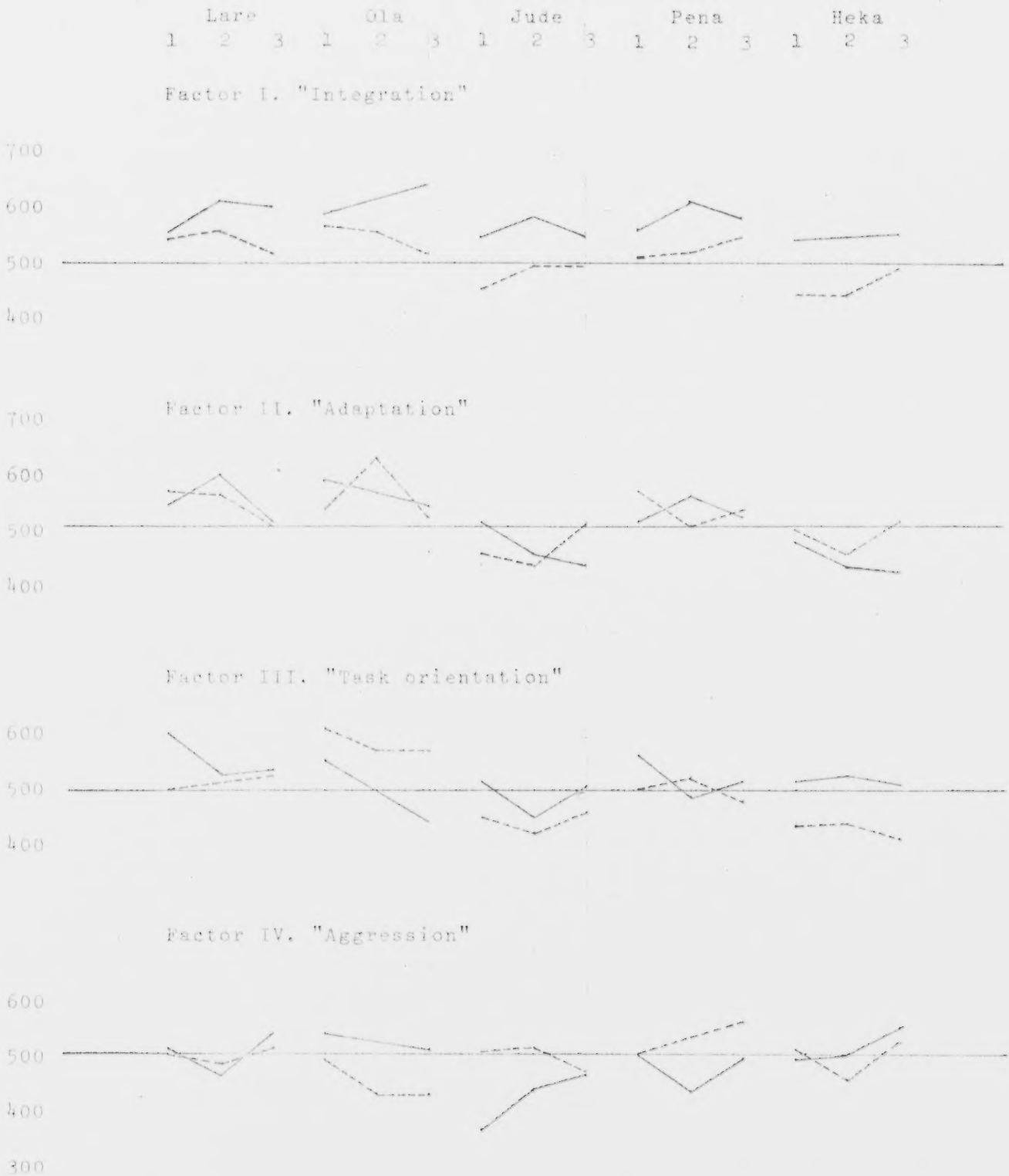


Figure 4. Phase movement - boys

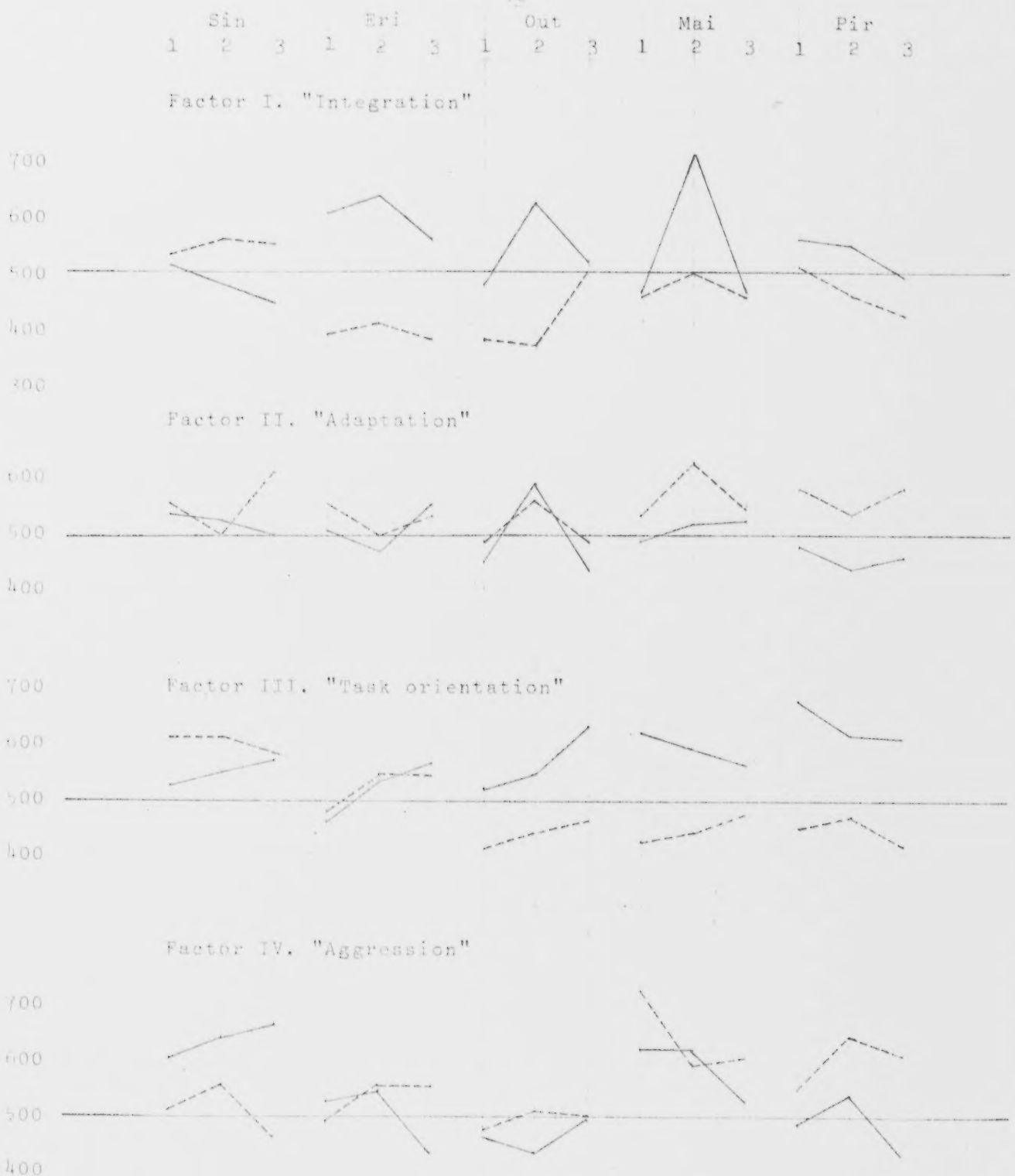


Figure 5. Phase movement - girls

Correlations between the phases were computed in terms of the pupils' phase-specific factor scores.

Table 3. Intercorrelations of phases by factors

Factor I. "Integration"

	1st phase	2nd phase	3rd phase
1st phase			
2nd phase	.77		
3rd phase	.64	.71	

Factor II. "Adaptation"

	1st phase	2nd phase	3rd phase
1st phase			
2nd phase	.53		
3rd phase	.50	.56	

Factor III. ".ask orientation"

	1st phase	2nd phase	3rd phase
1st phase			
2nd phase	.54		
3rd phase	.55	.60	

Factor IV. "Aggression"

	1st phase	2nd phase	3rd phase
1st phase			
2nd phase	.52		
3rd phase	.41	.42	

The correlations were highest in the case of the integration factor and lowest in the aggression factor. The correlations between the phases indicate the extent to which the total variance of a factor is attributable to variations shown by the pupils from one phase to another. Where the correlation is high, the trait or characteristic concerned is one associated with the pupil's personality and will be comparatively stable. If the correlation is rather low, the trait or characteristic concerned is one that falls upon the pupil by chance. This also

applies to factors representing a characteristic of rare occurence (aggression).

7.5. Role differentation

In the pupil-by-pupil analysis the pupils' roles as actors and reactors of interaction were described and analysed. Yet it was also regarded as desirable to consider role differentation in a somewhat wider setting. In table 4, the pupils' rank order in social status, some of Koskenniemi's sociological individual types (die Soziologischen Individuentypen; Koskenniemi 1936, 261-276) and interaction behaviour on the factor level are cross-tabulated. The definitions of the sociological individual types are given in Appendix 4.

The information contained in the table can be summarized as follows:

A genuine leader is among the top individuals of the class as regards to his social status, in most cases integrative in his interaction behaviour, adaptive and task oriented. If the leader is an autocrat type by nature, aggression is also involved in his interaction behaviour. The communication directed by the group members at a genuine leader is integrative, task oriented and adaptive. Aggression is rarely directed at him, whereas an autocrat is often dealt with aggressively.

A contributor is popular in his class and integrative in his communication. Judging by the present data it seems that the contributor is envied; he is ignored integratively by the group members and dealt with aggressively.

An outsider is unpopular but tries to orient himself toward the task in his group. He tries this even aggressively, and the group members treat him accordingly.

Koskenniemi's typology rested on extensive sociometric investigations covering a long period of time in school classes and outside them. It would seem that these types and the "inter

Table 4. An overview of selected pupils' rank order in social status, sociological individual types and interaction behaviour

	Rank order in Social Status[1]				"Sociological Individual Types"	Interaction behaviour in factor scores			
	1	2	3	4		Integration	Adaptation	Task-orient.	Aggression
Boys									
Lare	7	6.5	8.5	1	Genuine leader	a) ++ b) ++	a) + b) +	a) + b) 0	a) 0 b) 0
Ola	1	2	2.5	4.5	Genuine leader	a) ++ b) +	a) + b) +	a) 0 b) ++	a) 0 b) -
Heka	15	16.5	16	16	Outsider	a) 0 b) -	a) - b) 0	a) 0 b) -	a) + b) 0
Girls									
Sin	2	3	1	2	Genuine leader (autocrat)	a) 0 b) 0	a) + b) +	a) + b) ++	a) ++ b) 0
Eri	5	4	2.5	4.5	Contributor	a) + b) -	a) 0 b) 0	a) 0 b) 0	a) 0 b) +
Jaa	15	15.5	16	16	Outsider	a) 0 b) 0	a) 0 b) +	a) + b) -	a) ++ b) ++

Symbols: ++ = over 600 (fs)
+ = 600-550 (fs)
0 = 550-450 (fs)
- = 450-400 (fs)
-- = under 400 (fs)

a) as an actor
b) as a reactor

1)=Tests measuring social status

action types" differentiating in the course of interaction have at least indirect connections with each other.

7.6. Intercorrelations between tests, assessment and sociometric variables and interaction variables

The tests, assessment and sociometric variables are listed in Appendix 5. A factor analysis of these variables yielded three factors of clear interpretation, whereas the fourth factor was diffuse. The three factors respectively described a) adaptation to school, b) verbal ability and c) social status in the school class. The fourth factor and loadings in the pupils' assessed position in the circle of companions, and mathematical reasoning. In table 5 the correlative connections of these factors with the interaction variables are presented in terms of factor scores.

Table 5. Correlations of factor scores of tests, assessment and sociometric variables with the factor scores of the actor- and reactor-level interaction variables

	I	II	III	IV
1		$.56^{xx}$		
2		$.67^{xxx}$		
3		$.46^{x}$	$(.63^{xx})$	$(-.45^{x})$
4	(44^{x})			

Test factors:

1. Adjustment to school
2. Verbal ability
3. Social status in class
4. Unnamed (assessed position in circle of companions and mathematical reasoning)

Interaction factors:

I. Integration
II. Adaptation
III. Task orientation
IV. Aggression

( ) = Reactor-level

The correlative relationships were unexpectedly few in number. Social status in the class correlated with adaptation, task orientation and negatively with aggression. The sociometric measurements involved both friendship, cooperation and leader preferences, and, thus, in these respects the relationships seem meaningsful. On the basis of the table that the distinction made in interaction between the actor and reactor levels also appears justifiable. The connections of adjustment to school and verbal ability with adaptation are somewhat more difficult to interpret, although they do not seem completely unreasonable either. On the other hand, the connection of the assessed position in the circle of companions and mathematical reasoning with integration is difficult to interpret (the connection was not close, it is true). It should be noted, however, that linear relationships between comparatively static characteristics and so-called dynamic interaction variables are rather complicated (Flanders 1970, 381, 398-400; Mason 1970, 49-56). These relationships should in continuation studies be subjected to painstaking analysis.

8. Concluding remarks

The aim of the study was to describe and analyse the nature of group work in a given school class. The design, methods and results deserve critical consideration.

(1) The study was in the nature of a so-called case approach. A small group of pupils was investigated intensively, at the cost of extensiveness. The centre of emphasis was, of course, on methodological problems. As small groups have been investigated to a large extent by means of Bales's process analysis, a study like the present one can also aim at the formulation of hypotheses.

(2) The relevance of multivariate methods to interaction analysis was criticized even in the empirical part of this study. In researches of a basic nature, one is often content with

orthogonal factors, although it is not certain whether such an approach is justifiable in the description of interaction (Cattell 1966, 186).

(3) The phase movement analysis was carried out in such a way that first the entire group work material was factored, and factor scores were computed for the pupils by the phases. For a thorough phase analysis a notably large number of observations would be necessary, so that each phase could be factored separately and the phase structures obtained could be compared.

(4) In process investigations more attention should be given to the gaps that will remain between the analysed lessons. For a gapless group work study, again, department from the school's official work shedule will be necessary, and this often causes difficulty.

The study showed that even the investigation of a single mode of instruction, i.e., group work, is a highly complicated task. It revealed, on the other hand, the fertility of the use of a theoretical framework in an intensive case approach. Pupils' group work is coloured with adaptive and task-oriented acts - which, following Zellditch Jr., could be termed instrumental acts - and with aggressive and integrative acts, which could be taken to present expressive activity (Zellditch 1956, 404). According to Bloom's taxonomy, these may be regarded as counterparts of a kind of the cognitive and affective objective areas of school (Bloom 1965). In future studies it would be interesting to try to examine what are the weights of these areas in various forms of instruction.

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Appendix 1.

R-analysis:
Interaction variables - rotated factor matrix (four factors)

1	0.010	0.586	-0.021	-0.062	0.347
2	0.757	0.065	0.049	0.015	0.580
3	0.267	0.560	0.484	-0.197	0.658
4	0.102	0.675	0.159	-0.296	0.579
5	0.706	0.245	0.304	-0.209	0.694
6	0.588	0.347	0.489	-0.305	0.798
7	0.444	0.534	0.518	-0.216	0.797
8	0.169	0.466	0.452	0.031	0.452
9	0.176	0.035	0.752	-0.186	0.632
10	0.405	0.504	0.387	-0.484	0.802
11	0.647	-0.034	0.407	-0.265	0.656
12	0.132	0.212	0.179	-0.721	0.614
13	0.476	0.270	0.625	-0.350	0.812
Eigen-value	2.581	2.174	2.370	1.296	8.420
%	19.854	16.723	18.231	9.969	64.769

Appendix 2.

R-analysis:
Test variables, personality trait assessment and sociometric variables - rotated factor matrix (four factors)

	1	2	3	4	h^2
1	-0.064	-0.492	0.212	0.048	0.293
2	-0.102	0.150	0.269	0.165	0.132
3	0.035	-0.256	-0.097	0.074	0.081
4	0.129	-0.106	0.132	0.745	0.627
5	-0.339	-0.373	0.498	0.029	0.503
6	0.168	-0.556	0.491	-0.286	0.660
7	0.177	-0.417	-0.366	0.423	0.518
8	0.062	-0.761	0.146	0.251	0.666
9	0.006	-0.708	-0.018	0.346	0.621
10	-0.124	-0.613	0.399	0.066	0.555
11	0.121	-0.807	-0.007	-0.010	0.666
12	-0.043	-0.810	0.218	0.095	0.714
13	-0.158	-0.796	0.164	0.225	0.736
14	0.014	-0.264	-0.124	0.623	0.474
15	-0.137	-0.208	0.101	0.650	0.495
16	0.175	-0.728	-0.032	0.341	0.678
17	0.390	0.157	0.127	0.410	0.360
18	0.126	-0.081	0.282	0.738	0.646
19	-0.003	-0.464	0.350	0.705	0.835
20	0.151	-0.549	0.328	0.425	0.613
21	0.820	-0.169	0.355	0.280	0.906
22	0.666	-0.184	0.260	0.242	0.604
23	0.882	0.044	0.187	-0.260	0.883
24	0.877	-0.153	0.336	0.044	0.906
25	-0.803	-0.264	0.163	0.191	0.777
26	-0.373	-0.236	0.256	0.583	0.600
27	-0.151	-0.250	0.484	0.751	0.884
28	0.854	0.053	0.312	-0.101	0.841
29	0.560	-0.120	0.506	0.496	0.831
30	0.930	-0.185	0.170	0.115	0.941
31	0.385	-0.100	0.849	0.017	0.880
32	0.161	-0.418	0.676	0.057	0.660
33	0.271	-0.200	0.876	0.039	0.882
34	0.126	-0.096	0.889	0.057	0.819
35	0.197	-0.081	0.826	0.047	0.730
36	0.224	-0.049	0.784	0.460	0.880
37	0.194	-0.243	0.876	0.283	0.944
38	0.165	-0.122	0.813	0.366	0.838
39	0.334	0.068	0.805	0.201	0.805
40	0.214	-0.054	0.621	0.481	0.666
Eigen-value	6.459	6.228	8.920	5.540	27.148
%	16.147	15.570	22.300	13.850	67.870

Appendix 3.

The general course of a group work lesson - 12th lesson

Theme	Mathematics - problems
Objective	The problems were rather difficult, and the objective was to solve them through cooperation.
Course of lesson	Initially all the group members exerted themselves to solve the problems. When their solutions proved difficult, a part of the group resigned, and in conversation the group members would malign one another a lot and persist in their own views.
Group members	Ola: The only group member who had the strength to try with perseverance to the end. He had set to himself the task of solving the problems. Typical utterances: "Now let's try once more!" "I won't give up." "You must not clown!" Lare: Enterprise and resignation alternated in Lare's behaviour. Pena: Ceased trying even during the initial phase Jude: Very quiet, followed the course of events as an outsider. Heka: Was no capable of fruitful work.

Appendix 4.

Koskenniemi's sociological individual types

I. L e a d e r s (Führer), the individuals who have proved to be the most influential in the group or community.

I A. Genuine leaders (Vollführer): individuals who prove definitely superior in all or in most areas and are generally esteemed;

I B. Temporary leaders (Spezialführer): individuals who, in comparison with genuine leaders, have only seldom or in a few areas an opportunity to exert a decisive influence;

I C. Autocrats (Machthaber): individuals whose leadership position rests on the domination of others.

II. F o l l o w e r s (Mitwirker): the individuals who take an active part in common activities but do not have a position resting on superiority.

II A. Contributors (Helfer): individuals who behave actively and on their own initiative but are unable to exert an influence on the group or community independently;

II B. Favourites (Beliebte): individuals whose position is based on the fact that they are liked by others or on some other comparable relationship;

II C. Satellites (Mitläufer): individuals who participate in common activities, without, however, influencing these activity.

II

III. B y s t a n d e r s (Wirkungsbeschränkte), the individuals whose participation in the activities of the group or community is limited.

III A. Hermits (Einzelgänger): individuals who fail to participate in common activities on their own accord;

III B. Outsiders (Kontaktverfehlende): individuals who, despite their own wish, fail even to achieve a satellite's position;

III C. Outcasts (Abgelehnte): individuals, who, when present, are dealt with rejectingly by the others.

(Koskenniemi 1936, 261-263)

Appendix 5.

List of Variables

I. Achievement, Personality-Trait Assessment, and Sociometric Variables

Achievement:

1. Picture Vocabulary
2. Completion of Squares
3. Figures
4. Additions
5. Synonyms
6. Word Groups
7. Perceptual Speed
8. J3
9. J4

The Three R's:

10. Vocabulary
11. Reading
12. Dictation
13. Test of Spelling
14. Arithmetic: Mechanical
15. Arithmetic: Problems
16. Sum of the Three R's

17. Test of Activity
18. Observed Activity

Personality-Trait Assessments:

19. Comprehension
20. Memory
21. Attention
22. State of Mind
23. Stability of Mind
24. Conscientiousness
25. Self-Awareness
26. Co[illegible]age
27. Status in the Circle of Companions
28. Adjustment
29. Willingness to Be in Contact
30. Attitude to the Teacher

Sociometry:

31. Work Companionship
32. Leadership
33. Work Companionship II
34. Friendship
35. Companionship During the Breaks
36. Work Companionship III
37. Group Leadership
38. Friendship -
39. Playmates at School
40. Spare-time Playmates

Appendix 5. (cont.)

II. Interaction Variables

1 . Shows solidarity
2 . Shows tension release
3 . Agrees, accepts
4_1. Gives directions
4_2. Gives suggestions
5 . Gives opinion
6 . Gives information
7 . Asks for information
8 . Asks for opinion
9 . Asks for suggestions
10 . Disagrees, shows rejection
11 . Shows tension
12 . Shows aggression

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